

REMARKS

Claims 1-62 are pending in this Application. No new matter is added. Reconsideration in view of the following remarks is respectfully requested.

I. Claims Define Patentable Subject Matter

The Office Action rejects claims 1-8, 16-18, 20-21, 29, 34-41, 49-51, 53-54, and 61-62 under 35 U.S.C. §103(a) as being unpatentable over Affes (US 2002/0051433) in view of Unser (“Sampling – 50 Years After Shannon”, Proceedings of the IEEE, Vol. 88, No. 4: pages 569-587, April 2000); rejects claims 9-15, 19, 22-25, 30, 42-48, 52, and 55-58 under 35 U.S.C. §103(a) as being unpatentable over Affes in view of Unser and further in view of Agee (US 2003/0123384); rejects claims 26 and 59 under 35 U.S.C. §103(a) as being unpatentable over Affes in view of Unser, Agee, and further in view of Huang (USPN 6,370,129); rejects claims 27 and 60 under 35 U.S.C. §103(a) as being unpatentable over Affes in view of Unser and further in view of Shatti (USPN 7,076,168); rejects claim 28 under 35 U.S.C. §103(a) as being unpatentable over Affes in view of Unser and further in view of Langberg (USPN 5,852,630); and rejects claims 31-33 under 35 U.S.C. §103(a) as being unpatentable over Affes in view of Unser, Agee, and further in view of Baum (USPN 7,218,666). Applicants respectfully traverse these rejections, as follows.

The Applicants disclose a novel and unobvious approach for processing signals that are sent over a wireless communication channel. For example, in accordance with an embodiment of the disclosure, a receiver may decode a received signal by sampling the received signal with a sampling frequency that is lower than the sampling frequency given by the Shannon theorem, lower than the chip rate of the received signal, but greater than the rate of innovation of the received signal. Such a decoding method may thus reduce the complexity and cost of receivers while retaining equivalent decoding performances.

Claim 1 recites, *inter alia*, “sampling the received signal ($y(t)$) with a sampling frequency (f_s) lower than the sampling frequency given by the Shannon theorem, lower than the chip rate ($1/T_c$) of said received signal ($y(t)$), but greater than the rate of innovation (ρ) of said received signal ($y(t)$), for generating a set of sampled values ($y(nT_s)$)” (emphasis added). Claims 28, 34, and 61-62 recite similar features.

In rejecting the claims, the Examiner, at page 3 of the Office Action, acknowledges that the primary reference, Affes, does not disclose or suggest sampling the signal with a sampling frequency that is lower than the chip rate ($1/T_c$) of the signal, but greater than the rate of innovation (ρ) of the signal, as recited in claims 1, 28, 34, and 61-62, yet continues to rely on Unser to make up for the lack of disclosure in Affes.

In particular, the Examiner, at pages 3-4 of the Office Action, cites section V, B of Unser, and alleges two points. The first point being that Unser discloses sampling a signal at the rate of innovation. And the second point being that “one of ordinary skill in the art at the time of the invention would clearly recognize the benefits of optimizing the sampling frequency, where sampling at a lower rate has the advantages of decreasing processing speed and power dissipation of the processing elements, while sampling at a higher rate decreases distortion (due to aliasing) in the sampled signal.”

Regarding the first point, the Applicants do not contend that Unser discloses sampling a signal at the rate of innovation. Unser, at section V, B, lines 7-9, states that “a reconstruction is generally possible provided there are as many measurements as there are degrees of freedom in the signal representation.” As the Examiner accurately suggested, the rate of innovation of a signal is defined as the number of degrees of freedom of the signal per unit time. It logically follows then that Unser teaches that reconstruction of a signal is possible provided that the

sampling rate is equal to the rate of innovation of the signal. This, however, is irrelevant because the claims expressly require sampling a signal at a frequency greater than the rate of innovation. Applicants respectfully submit that sampling at a frequency greater than the rate of innovation is very different from sampling at a frequency that is equal to the rate of innovation. Thus, Unser fails to disclose or suggest a sampling frequency that is greater than the rate of innovation, as recited in claims 1, 28, 34, and 61-62.

Regarding the second point, the Examiner appears to be taking official notice that there are benefits to sampling at a lower frequency as well as sampling at a higher frequency. The Examiner then alleges that it would be obvious to one of ordinary skill in the art to lower the sampling frequency of Affes to a frequency lower than the chip rate, but greater than the rate of innovation so as to bestow the benefits of both lower and higher sampling frequencies. The Applicants respectfully disagree.

First of all, Unser nowhere whatsoever discloses a sampling frequency lower than the chip rate. As previously discussed, Unser, at section V, B, lines 7-9, merely states that “a reconstruction is generally possible provided there are as many measurements as there are degrees of freedom in the signal representation,” and does not suggest a sampling frequency lower than the chip rate of the received signal, as recited in claims 1, 28, 34, and 61-62.

Accordingly, Unser fails to suggest a sampling frequency that is: (1) lower than the chip rate; and (2) greater than the rate of innovation. As Unser fails to disclose these two features, Applicants fail to see how one of ordinary skill in the art would be motivated to combine Unser and Affes to obtain the claimed sampling frequency.

Second of all, Applicants respectfully submit that Affes teaches away from sampling at a frequency lower than the chip rate. Specifically, Affes, in paragraph [0119], discloses that ‘the

matched filtered signal vector $Y(t)$... is sampled by sampler 23 at the chip rate $1/T_c$ " (emphasis added), and not at a rate lower than the chip rate. In paragraphs [0138]-[0139], Affes states that "after sampling at the chip rate $1/T_c$ and framing over $2L-1$ chip samples at the bit rate to from a frame, the preprocessing unit 18 derives the $M \times (2L - 1)$ matched-filtering observation matrix." Throughout paragraphs [0140]-[0145], Affes describes how using a post-correlation data model (PCM) with the matrix parameters derived from sampling the signal vector $Y(t)$ at the chip rate $1/T_c$ reduces inter-symbol interference. Thus, not only does Affes fails to disclose a sampling frequency lower than the chip rate, Affes teaches away from such a sampling frequency by placing such a great emphasis on sampling at the chip rate in order to reduce inter-symbol interference. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). The Federal Circuit has held that teaching away from the art of the subject invention is a *per se* demonstration of lack of *prima facie* obviousness. *In re Dow Chemical Co.*, 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988).

Furthermore, the Applicants respectfully submit that modifying Affes to sample below the chip rate would render Affes inoperable for its intended purpose. Even if Unser did disclose a sampling frequency lower than the chip rate (not admitted), one of ordinary skill in the art would not be motivated to lower the sampling frequency of Affes to below the chip rate, as suggested by the Examiner, because such a modification would cause the device of Affes unable to reduce inter-symbol interference as a result of the lower sampling rate, rendering the device of Affes inoperable for its intended purpose. If a reference is cited that requires some modification in order to meet the claimed invention or requires some modification in order to be properly

combined with another reference and such a modification destroys the purpose or function of the invention disclosed in the reference, one of ordinary skill in the art would not have found a reason to make the claimed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

In general, it appears that the Examiner's rationale for combining the teachings of Affes and Unser is to achieve the benefits identified in Applicants' Specification (e.g., to reduce the complexity and cost of receivers while retaining equivalent decoding performances (paragraph [0011] of the published Specification)). Applicants respectfully submit that this is an unacceptable and improper basis for a rejection under 35 U.S.C. § 103. In essence, the Examiner is basing the rejection on the assertion that it would have been obvious to do something not suggested in the art because so doing would provide advantages stated in Applicants' Specification. This sort of rationale has been condemned by the CAFC; see, for example, *Panduit Corp. v. Dennison Manufacturing Co.*, 1 USPQ2d 1593 (Fed. Cir. 1987).

To reject claims in an application under § 103, the Examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See MPEP §2143. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Here, the Examiner has failed to meet all of the three criteria required for a *prima facie*

case of obviousness. Specifically, the Examiner (1) failed to present any documentary evidence of motivation either in the Affes or Unser or in the knowledge generally available to one of ordinary skill in the art, to modify Affes or to combine reference teachings; (2) the Examiner failed to show how the proposed modification of Affes has a reasonable expectation of success, as the proposed modification would render Affes inoperable for its intended purpose; and (3) the Examiner failed to show that Affes and Unser teach or suggest all the claim limitations (e.g., sampling the received signal with a sampling frequency lower than the chip rate of said received signal, but greater than the rate of innovation of said received signal, as recited in claims 1, 28, 34, and 61-62). As such, the Examiner has failed to establish a proper *prima facie* case of obviousness.

Secondary references Agee, Huang, Shatti, Langberg, Baum, either individually or in combination with Affes and Unser also fail to disclose or suggest the features recited in claims 1 and 28, 34, and 61-62, and as such, fail to make up for the deficiencies of Affes and Unser.

II. Conclusion

Accordingly the Applicants submit that claims 1, 28, 34, and 61-62 define patentable subject matter. Claims 2-33 and 35-60 depend from claims 1 and 34, respectively, and therefore, also define patentable subject matter, as well as for the additional features recited therein.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-62 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number set forth below.

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Qualcomm, Inc.
5775 Morehouse Drive
San Diego, California 92121
Telephone: (858) 658-5787
Facsimile: (858) 658-2502

Respectfully Submitted,

By: 
Dang Vo, Reg. No. 45,183
Tel. No. (858) 845-2116